Space Weather Forecast

Issued on Thursday, 04 November 2021 at 12:31 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G3/Strong or G4/Severe geomagnetic storms expected early on day 1 (4th), with G1/Minor to G3/Strong geomagnetic storms likely early day 2 (5th). Slight chance of further M-class flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: There are two sunspot regions on the visible disc with observed solar activity returning to Low over the past 24 hours. The peak flare was a long duration Common class flare at 03/2117 UTC from the sunspot region transiting the northwest quadrant (which gave the Moderate flare and Earth directed Coronal Mass Ejection (CME) early on 2nd). This region has reduced slightly in overall size, and decay in its lead/trailer spots. The other sunspot region in the northeast quadrant appears stable with very little recent activity. A CME appears to have left the Sun associated with the common class flare. This is awaiting analysis, but appears not to be earth-directed.

The CME from the early hours of the 2nd November arrived at Earth around 03/2000 UTC.

Solar Wind / Geomagnetic Activity: Initial solar wind parameters were indicating a waning connection to the high speed stream from coronal hole (around 500-550km/s). However, following the arrival of the CME they increased to near 750 km/s. A steady but slight decline to speeds of 670km/s was observed to the end of the period. Total interplanetary magnetic field was at weak levels before becoming strong post CME, with the important north-south component fluctuating from negative to positive initially, but with a prolonged period of negative component from 04/0400 UTC onwards. Geomagnetic activity was Quiet to Unsettled until the 1800-2100 UTC interval when it became Active (Kp4). At the 2100-2359 UTC interval a G3/Strong geomagnetic storm was observed. G2/Moderate to G3/Strong activity was recored 04/0000-0900 UTC, followed by a G4/Severe storm interval 0900-1200 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained slightly elevated only very briefly exceeding S1/Minor storm levels between 03/2055 and 03/2105 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to remain mainly low through the next four days, but with a continuing slight chance of Moderate class flares from the spot currently transiting to the northwest quadrant.

Solar Wind / Geomagnetic Activity: Solar wind speeds are currently at strong levels (around 670km/s) owing to the arrival of the CME that arrived at earth late in the UTC day on the 3rd. As the effects from this feature wane in the coming days a reduction in speeds is anticipated to slightly elevated or background levels. Geomagnetic activity is currently at G4/Severe Storm levels. Activity is expected to reduce on day 1 (4th) and day 2 (5th) back to Active/Kp4 to G2/Moderate storm levels with a chance of an isolated G3/Strong storm interval. By days 3 and 4 (6th and 7th) activity is expected to be Quiet to Unsettled with a slight chance of Active intervals.

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Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to be below storm level with a slight chance of exceedance on days 1 and 2 (4th and 5th).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	100	90	10	1
Strong	G3	Yes	100	30	1	1
Severe	G4	Yes	90	5	1	1
Extreme	G5	No	5	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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